

SEQUENCE LISTING

<110> Wang, Chang Yi  
Walfield, Alan M.

<120> PEPTIDE COMPOSITION AS IMMUNOGEN FOR THE TREATMENT OF  
ALLERGY

<130> 1151-4153US2

<150> 09/701,623  
<151> 2000-12-01

<150> PCT/US99/13959  
<151> 1999-06-21

<150> 09/100,287  
<151> 1998-06-20

<160> 91

<170> PatentIn Ver. 2.1

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<301> Dorrington,  
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<304> 41  
<306> 3-25  
<307> 1978

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Val Cys Ser Arg Asp Phe Thr Pro Pro Thr Val Lys Ile Leu Gln Ser  
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Ser Cys Asp Gly Gly His Phe Pro Pro Thr Ile Gln Leu Leu Cys  
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Leu Val Ser Gly Tyr Thr Pro Gly Thr Ile Asn Ile Thr Trp Leu Glu  
35 40 45

Asp Gly Gln Val Met Asp Val Asp Leu Ser Thr Ala Ser Thr Thr Gln  
50 55 60

Glu Gly Glu Leu Ala Ser Thr Gln Ser Glu Leu Thr Leu Ser Gln Lys  
65 70 75 80

His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr Gln Gly  
85 90 95

His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn Pro Arg  
100 105 110

Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu Phe Ile  
115 120 125

Arg Lys Ser Pro Thr Ile Thr Cys Leu Val Val Asp Leu Ala Pro Ser  
130 135 140

Lys Gly Thr Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Lys Pro Val  
145 150 155 160

Asn His Ser Thr Arg Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr  
165 170 175

Val Thr Ser Thr Leu Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu  
180 185 190

Thr Tyr Gln Cys Arg Val Thr His Pro His Leu Pro Arg Ala Leu Met  
195 200 205

Arg Ser Thr Thr Lys Thr Ser Gly Pro Arg Ala Ala Pro Glu Val Tyr  
210 215 220

Ala Phe Ala Thr Pro Glu Trp Pro Gly Ser Arg Asp Lys Arg Thr Leu  
225 230 235 240

Ala Cys Leu Ile Gln Asn Phe Met Pro Glu Asp Ile Ser Val Gln Trp  
245 250 255

Leu His Asn Glu Val Gln Leu Pro Asp Ala Arg His Ser Thr Thr Gln  
260 265 270

Pro Arg Lys Thr Lys Gly Ser Gly Phe Phe Val Phe Ser Arg Leu Glu  
275 280 285

Val Thr Arg Ala Glu Trp Gln Glu Lys Asp Glu Phe Ile Cys Arg Ala  
290 295 300

Val His Glu Ala Ala Ser Pro Ser Gln Thr Val Gln Arg Ala Val Ser  
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Val Asn Pro Gly Lys  
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<303> Immunogenetics  
<304> 41  
<306> 282-286  
<307> 1995

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Ser Cys Asn Pro Val Gly Asp Thr His Thr Thr Ile Gln Leu Leu Cys  
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Leu Ile Ser Gly Tyr Val Pro Gly Asp Met Glu Val Ile Trp Leu Val  
35 40 45

Asp Gly Gln Lys Ala Thr Asn Ile Phe Pro Tyr Thr Ala Pro Gly Thr  
50 55 60

Lys Glu Gly Asn Val Thr Ser Thr His Ser Glu Leu Asn Ile Thr Gln  
65 70 75 80

Gly Glu Trp Val Ser Gln Lys Thr Tyr Thr Cys Gln Gly Phe Thr Phe  
85 90 95

Lys Asp Glu Ala Arg Lys Cys Ser Glu Ser Asp Pro Arg Gly Val Thr  
100 105 110

Ser Tyr Leu Ser Pro Pro Ser Pro Leu Asp Leu Tyr Val His Lys Ala  
115 120 125

Pro Lys Ile Thr Cys Leu Val Val Asp Leu Ala Thr Met Glu Gly Met  
130 135 140

Asn Leu Thr Trp Tyr Arg Glu Ser Lys Glu Pro Val Asn Pro Gly Pro  
145 150 155 160

Leu Asn Lys Lys Asp His Phe Asn Gly Thr Ile Thr Val Thr Ser Thr  
165 170 175

Leu Pro Val Asn Thr Asn Asp Trp Ile Glu Gly Glu Thr Tyr Tyr Cys  
180 185 190

Arg Val Thr His Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala  
195 200 205

Lys Ala Pro Gly Lys Arg Ala Pro Pro Asp Val Tyr Leu Phe Leu Pro  
210 215 220

Pro Glu Glu Glu Gln Gly Thr Lys Asp Arg Val Thr Leu Thr Cys Leu  
225 230 235 240

Ile Gln Asn Phe Phe Pro Ala Asp Ile Ser Val Gln Trp Leu Arg Asn  
245 250 255

Asp Ser Pro Ile Gln Thr Asp Gln Tyr Thr Thr Gly Pro His Lys  
260 265 270

Val Ser Gly Ser Arg Pro Ala Phe Phe Ile Phe Ser Arg Leu Glu Val  
275 280 285

Ser Arg Val Asp Trp Glu Gln Lys Asn Lys Phe Thr Cys Gln Val Val  
290 295 300

His Glu Ala Leu Ser Gly Ser Arg  
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<306> 3-25  
<307> 1978

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<301> Patel,  
<303> Immunogenetics  
<304> 41  
<306> 282-286  
<307> 1995

<300>  
<301> Steen,  
<303> J. Mol. Biol.  
<304> 177  
<306> 19-32  
<307> 1984

<300>  
<301> Ishida,  
<303> EMBO J.  
<304> 1  
<306> 1117-1123  
<307> 1982

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Ala Arg Pro Val Asn Ile Thr Lys Pro Thr Val Asp Leu Leu His Ser  
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Ser Cys Asp Pro Asn Ala Phe His Ser Thr Ile Gln Leu Tyr Cys Phe  
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Val Tyr Gly His Ile Gln Asn Asp Val Ser Ile His Trp Leu Met Asp  
35 40 45  
Asp Arg Lys Ile Tyr Asp Thr His Ala Gln Asn Val Leu Ile Lys Glu  
50 55 60  
Glu Gly Lys Leu Ala Ser Thr Tyr Ser Arg Leu Asn Ile Thr Gln Gln  
65 70 75 80  
Gln Trp Met Ser Glu Ser Thr Phe Thr Cys Lys Val Thr Ser Gln Gly  
85 90 95  
Glu Asn Tyr Trp Ala His Thr Arg Arg Cys Ser Asp Asp Glu Pro Arg  
100 105 110  
Gly Val Ile Thr Tyr Leu Ile Pro Pro Ser Pro Leu Asp Leu Tyr Glu  
115 120 125  
Asn Gly Thr Pro Lys Leu Thr Cys Leu Val Leu Asp Leu Glu Ser Glu

130	135	140
Glu Asn Ile Thr Val Thr Trp Val Arg Glu Arg Lys Lys Ser Ile Gly		
145	150	155
Ser Ala Ser Gln Arg Ser Thr Lys His His Asn Ala Thr Thr Ser Ile		
165	170	175
Thr Ser Ile Leu Pro Val Asp Ala Lys Asp Trp Ile Glu Gly Glu Gly		
180	185	190
Tyr Gln Cys Arg Val Asp His Pro His Phe Pro Lys Pro Ile Val Arg		
195	200	205
Ser Ile Thr Lys Ala Leu Gly Leu Arg Ser Ala Pro Glu Val Tyr Val		
210	215	220
Phe Leu Pro Pro Glu Glu Glu Lys Asn Lys Arg Thr Leu Thr Cys		
225	230	235
Leu Ile Gln Asn Phe Phe Pro Glu Asp Ile Ser Val Gln Trp Leu Gln		
245	250	255
Asp Ser Lys Leu Ile Pro Lys Ser Gln His Ser Thr Thr Thr Pro Leu		
260	265	270
Lys Thr Asn Gly Ser Asn Gln Arg Phe Phe Ile Phe Ser Arg Leu Glu		
275	280	285
Val Thr Lys Ala Leu Trp Thr Gln Thr Lys Gln Phe Thr Cys Arg Val		
290	295	300
Ile His Glu Ala Leu Arg Glu Pro Arg		
305	310	
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15		
His Arg Cys Asp Pro Asn Ala Phe His Ser Thr Ile Gln Leu Tyr Cys		
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Phe Ile Tyr Gly His Ile Leu Asn Asp Val Ser Val Ser Trp Leu Met		
35	40	45
Asp Asp Arg Glu Ile Thr Asp Thr Leu Ala Gln Thr Val Leu Ile Lys		
50	55	60
Glu Glu Gly Lys Leu Ala Ser Thr Cys Ser Lys Leu Asn Ile Thr Glu		
65	70	75
80		
Gln Gln Trp Met Ser Glu Ser Thr Phe Thr Cys Arg Val Thr Ser Gln		

85	90	95	
Gly Cys Asp Tyr Leu Ala His Thr Arg Arg Cys Pro Asp His Glu Pro			
100	105	110	
Arg Gly Ala Ile Thr Tyr Leu Ile Pro Pro Ser Pro Leu Asp Leu Tyr			
115	120	125	
Gln Asn Gly Ala Pro Lys Leu Thr Cys Leu Val Val Asp Leu Glu Ser			
130	135	140	
Glu Lys Asn Val Asn Val Thr Trp Asn Gln Glu Lys Lys Thr Ser Val			
145	150	155	160
Ser Ala Ser Gln Trp Tyr Thr Lys His His Asn Asn Ala Thr Thr Ser			
165	170	175	
Ile Thr Ser Ile Leu Pro Val Val Ala Lys Asp Trp Ile Glu Gly Tyr			
180	185	190	
Gly Tyr Gln Cys Ile Val Asp Arg Pro Asp Phe Pro Lys Pro Ile Val			
195	200	205	
Arg Ser Ile Thr Lys Thr Pro Gly Gln Arg Ser Ala Pro Glu Val Tyr			
210	215	220	
Val Phe Pro Pro Pro Glu Glu Glu Ser Glu Asp Lys Arg Thr Leu Thr			
225	230	235	240
Cys Leu Ile Gln Asn Phe Phe Pro Glu Asp Ile Ser Val Gln Trp Leu			
245	250	255	
Gly Asp Gly Lys Leu Ile Ser Asn Ser Gln His Ser Thr Thr Thr Pro			
260	265	270	
Leu Lys Ser Asn Gly Asn Gln Gly Phe Phe Ile Phe Ser Arg Leu Glu			
275	280	285	
Val Ala Lys Thr Leu Trp Thr Gln Arg Lys Gln Phe Thr Cys Gln Val			
290	295	300	
Ile His Glu Ala Leu Gln Lys Pro Arg			
305	310		

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 Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro Arg  
 1 5 10 15  
 Ala Leu Met Arg Ser Thr Thr Lys Cys  
 20 25

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material as source

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Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro His Leu Pro Lys  
1 5 10 15

Asp Ile Val Arg Ser Ile Ala Lys Cys  
20 25

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material as source

<400> 7  
Cys Gly Glu Gly Tyr Gln Ser Arg Val Asp His Pro His Phe Pro Lys  
1 5 10 15

Pro Ile Val Arg Ser Ile Thr Lys Cys  
20 25

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material as source

<400> 8  
Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp Arg Pro Asp Phe Pro Lys  
1 5 10 15

Pro Ile Val Arg Ser Ile Thr Leu Cys  
20 25

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Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
1 5 10 15

Ile Asp

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<223> K, R

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Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa  
1 5 10 15

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Ile Ser Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa  
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Xaa Leu Phe

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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu  
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Thr Ala Lys Ser Lys Lys Phe Pro Ser Tyr Thr Ala Thr Tyr Gln Phe  
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Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
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Ile Asp Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro

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His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
35 40 45

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<211> 63

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Thr Ala Lys Ser Lys Lys Phe Pro Ser Tyr Thr Ala Thr Tyr Gln Phe  
1 5 10 15

Gly Gly Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile  
20 25 30

Thr Thr Ile Asp Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr  
35 40 45

His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
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Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr Ile Asp  
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Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu  
35 40 45

Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
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<223> G, T

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Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa  
1 5 10 15

Ile Leu Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His  
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Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
35 40 45

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Gly Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu  
20 25 30

Xaa Ile Leu Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr  
35 40 45

His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys

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Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa Ile Leu  
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Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His  
35 40 45

Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
50 55 60

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Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa Gly  
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Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro  
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Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
35 40

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Thr Ala Lys Ser Lys Lys Phe Pro Ser Tyr Thr Ala Thr Tyr Gln Phe  
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Gly Gly Xaa Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa

20

25

30

Xaa Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His  
35 40 45

Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Gly Gly Xaa Xaa  
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Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa Gly Gly Cys  
20 25 30

Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro Arg Ala  
35 40 45

Leu Met Arg Ser Thr Thr Lys Cys  
50 55

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Ile Leu Phe Gly Gly Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp His  
20 25 30

Pro Asp Phe Pro Lys Pro Ile Val Arg Ser Ile Thr Lys Cys  
35 40 45

<210> 25  
<211> 45  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 25  
Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
1 5 10 15

Ile Asp Gly Gly Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp His Pro  
20 25 30

Asp Phe Pro Lys Pro Ile Val Arg Ser Ile Thr Lys Cys  
35 40 45

<210> 26  
<211> 45  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 26  
Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr  
1 5 10 15

Ile Asp Gly Gly Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro  
20 25 30

His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
35 40 45

<210> 27  
<211> 46  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<220>  
<221> MOD\_RES

<222> (1)  
<223> I, M, L

<220>  
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<222> (2)  
<223> S, T

<220>  
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<222> (7)  
<223> K, L

<220>  
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<222> (8)  
<223> G, R

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<222> (9)  
<223> V, T

<220>  
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<222> (10)  
<223> I, V

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<222> (14)  
<223> I, T

<220>  
<221> MOD\_RES  
<222> (15)  
<223> E, R

<220>  
<221> MOD\_RES  
<222> (16)  
<223> G, M

<220>  
<221> MOD\_RES  
<222> (19)  
<223> F, T

<220>  
<221> MOD\_RES  
<222> (20)  
<223> G, M

<400> 27  
Xaa Xaa Ile Ser Glu Ile Xaa Gly Val Xaa Val His Lys Xaa Xaa Xaa  
1 5 10 15

Ile Leu Xaa Xaa Gly Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His  
20 25 30

Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys

35

40

45

<210> 28  
<211> 49  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 28  
Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro  
1 5 10 15  
Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu  
20 25 30  
Val Val Asp Leu Ala Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser  
35 40 45

Arg

<210> 29  
<211> 60  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 29  
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
1 5 10 15  
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
20 25 30  
Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp Leu Ala  
35 40 45  
Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg  
50 55 60

<210> 30  
<211> 64  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 30  
Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys  
1 5 10 15  
Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser  
20 25 30  
Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val  
35 40 45  
Val Asp Leu Ala Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg  
50 55 60

<210> 31  
<211> 76  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 31  
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr  
1 5 10 15  
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30  
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
35 40 45  
Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp Leu Ala  
50 55 60  
Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg  
65 70 75

<210> 32  
<211> 35  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 32  
Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro  
1 5 10 15  
Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu  
20 25 30

Val Val Asp  
35

<210> 33  
<211> 46  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide synthesized from amino acids with no genetic material as source

<400> 33  
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
1 5 10 15

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
20 25 30

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp  
35 40 45

<210> 34  
<211> 50  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide synthesized from amino acids with no genetic material as source

<400> 34  
Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys  
1 5 10 15

Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser  
20 25 30

Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val  
35 40 45

Val Asp  
50

<210> 35  
<211> 62  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide synthesized from amino acids with no genetic material as source

<400> 35  
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr

1

5

10

15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp  
50 55 60

<210> 36

<211> 29

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 36

Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro  
1 5 10 15

Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile  
20 25

<210> 37

<211> 40

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 37

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
1 5 10 15

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
20 25 30

Phe Ile Arg Lys Ser Pro Thr Ile  
35 40

<210> 38

<211> 44

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 38  
Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys  
1 5 10 15

Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser  
20 25 30

Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile  
35 40

<210> 39

<211> 56

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 39  
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr  
1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile  
50 55

<210> 40

<211> 76

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 40  
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr  
1 5 10 15

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu  
35 40 45

Phe Ile Arg Lys Ser Pro Thr Ile Thr Cys Leu Val Val Asp Leu Ala  
50 55 60

Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg  
65 70 75

<210> 41  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 41  
Cys Lys Gln Arg Asn Gly Thr Leu Thr Cys  
1 5 10

<210> 42  
<211> 45  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 42  
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr  
1 5 . 10 15  
  
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn  
20 25 30  
  
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro  
35 40 45

<210> 43  
<211> 34  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 43  
Cys Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg Ala Ser Gly  
1 5 10 15  
  
Lys Pro Val Asn His Ser Thr Arg Lys Glu Glu Lys Gln Arg Asn Gly  
20 25 30  
  
Thr Cys

<210> 44  
<211> 33  
<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 44

Cys Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr Tyr Gln Cys  
1 5 10 15

Arg Val Thr His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr  
20 25 30

Cys

<210> 45

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 45

Ser Thr Thr Lys Thr Ser Gly Pro Arg Ala Ala Pro Glu Val  
1 5 10

<210> 46

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 46

Cys Trp Ser Arg Ala Ser Gly Lys Pro Val Cys Asn His Ser  
1 5 10

<210> 47

<211> 19

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 47

Cys Ser Arg Pro Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr  
1 5 10 15

Ile Thr Cys

<210> 48  
<211> 13  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 48  
Cys Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Pro Cys  
1 5 10

<210> 49  
<211> 15  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 49  
Cys Pro Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Pro Cys  
1 5 10 15

<210> 50  
<211> 16  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 50  
Cys Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr Val Thr Ser Cys  
1 5 10 15

<210> 51  
<211> 8  
<212> PRT  
<213> Artificial Sequence  
  
<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 51

Lys Glu Glu Lys Gln Arg Asn Gly  
1 5

<210> 52  
<211> 11  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 52  
Cys Trp Ser Arg Ala Ser Gly Lys Pro Val Cys  
1 5 10

<210> 53  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 53  
Pro Thr Ile Thr Cys Leu Val Leu Asp Leu Ala Pro Ser Lys Gly Thr  
1 5 10 15  
Val Asn Leu Thr Cys  
20

<210> 54  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 54  
Pro Thr Ile Thr Cys Leu Val Leu Asp Leu Ala Pro Ser Lys Gly Thr  
1 5 10 15

<210> 55  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 55  
Thr Ser Thr Leu Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr  
1 5 10 15

Tyr Gln Cys Arg Val Thr His Pro His  
20 25

<210> 56  
<211> 16  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 56  
Pro Thr Ile Thr Ser Leu Val Leu Cys Leu Ala Pro Ser Lys Gly Cys  
1 5 10 15

<210> 57  
<211> 23  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 57  
Cys Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Lys Pro Val Asn His  
1 5 10 15

Ser Thr Arg Lys Glu Glu Cys  
20

<210> 58  
<211> 53  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 58  
Cys Thr Trp Ser Arg Ala Ser Gly Lys Pro Val Asn His Ser Thr Arg  
1 5 10 15

Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr Val Thr Ser Thr Leu  
20 25 30

Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr Tyr Gln Cys Arg  
35 40 45

Val Thr His Pro His  
50

<210> 59  
<211> 10  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 59  
Lys Thr Lys Gly Ser Gly Phe Phe Val Phe  
1 5 10

<210> 60  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<220>  
<221> MOD\_RES  
<222> (4)  
<223> S, T

<220>  
<221> MOD\_RES  
<222> (7)  
<223> K, R

<220>  
<221> MOD\_RES  
<222> (8)  
<223> G, T

<220>  
<221> MOD\_RES  
<222> (12)  
<223> H, T

<220>  
<221> MOD\_RES  
<222> (13)  
<223> K, R

<220>  
<221> MOD\_RES  
<222> (16)  
<223> G, T

<400> 60

Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa  
1 5 10 15

Ile Leu Phe

<210> 61  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 61  
Leu Ser Glu Ile Lys Gly Val Ile Val His Arg Leu Glu Gly Val  
1 5 10 15

<210> 62  
<211> 20  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 62  
Gly Ile Leu Glu Ser Arg Gly Ile Lys Ala Arg Ile Thr His Val Asp  
1 5 10 15

Thr Glu Ser Tyr  
20

<210> 63  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 63  
Lys Lys Gln Tyr Ile Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu  
1 5 10 15

Leu

<210> 64  
<211> 22  
<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 64

Lys Lys Phe Asn Asn Phe Thr Val Ser Phe Trp Leu Arg Val Pro Lys  
1 5 10 15

Val Ser Ala Ser His Leu  
20

<210> 65

<211> 30

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 65

Lys Lys Leu Arg Arg Leu Leu Tyr Met Ile Tyr Met Ser Gly Leu Ala  
1 5 10 15

Val Arg Val His Val Ser Lys Glu Glu Gln Tyr Tyr Asp Tyr  
20 25 30

<210> 66

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 66

Tyr Asp Pro Asn Tyr Leu Arg Thr Asp Ser Asp Lys Asp Arg Phe Leu  
1 5 10 15

Gln Thr Met Val Lys Leu Phe Asn Arg Ile Lys  
20 25

<210> 67

<211> 24

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 67  
Gly Ala Tyr Ala Arg Cys Pro Asn Gly Thr Arg Ala Leu Thr Val Ala  
1 5 10 15

Glu Leu Arg Gly Asn Ala Glu Leu  
20

<210> 68  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 68  
Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu Asp  
1 5 10 15

<210> 69  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 69  
Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro  
1 5 10 15

Asn Ala Pro Ile Leu  
20

<210> 70  
<211> 20  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 70  
Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser Ala  
1 5 10 15

Leu Tyr Arg Glu  
20

<210> 71  
<211> 20

<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 71  
Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu  
1 5 10 15

Met Thr Leu Ala  
20

<210> 72  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 72  
Trp Val Arg Asp Ile Ile Asp Asp Phe Thr Asn Glu Ser Ser Gln Lys  
1 5 10 15

Thr

<210> 73  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 73  
Arg Ala Gly Arg Ala Ile Leu His Ile Pro Thr Arg Ile Arg Gln Gly  
1 5 10 15

Leu Glu Arg

<210> 74  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 74  
Ala Val Ala Glu Gly Thr Asp Arg Val Ile Glu Val Leu Gln Arg Ala  
1 5 10 15  
Gly Arg Ala Ile Leu  
20

<210> 75  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 75  
Ala Leu Asn Ile Trp Asp Arg Phe Asp Val Phe Ser Thr Leu Gly Ala  
1 5 10 15  
Thr Ser Gly Tyr Leu Lys Gly Asn Ser  
20 25

<210> 76  
<211> 22  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 76  
Asp Ser Glu Thr Ala Asp Asn Leu Glu Lys Thr Val Ala Ala Leu Ser  
1 5 10 15  
Ile Leu Pro Gly His Gly  
20

<210> 77  
<211> 39  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 77  
Glu Glu Ile Val Ala Gln Ser Ile Ala Leu Ser Ser Leu Met Val Ala  
1 5 10 15  
Gln Ala Ile Pro Leu Val Gly Glu Leu Val Asp Ile Gly Phe Ala Ala  
20 25 30

Thr Asn Phe Val Glu Ser Cys  
35

<210> 78  
<211> 21  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 78  
Asp Ile Glu Lys Lys Ile Ala Lys Met Glu Lys Ala Ser Ser Val Phe  
1 5 10 15  
Asn Val Val Asn Ser  
20

<210> 79  
<211> 17  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 79  
Lys Trp Phe Lys Thr Asn Ala Pro Asn Gly Val Asp Glu Lys Ile Arg  
1 5 10 15  
Ile

<210> 80  
<211> 14  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 80  
Gly Leu Gln Gly Lys Ile Ala Asp Ala Val Lys Ala Lys Gly  
1 5 10

<210> 81  
<211> 19  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 81  
Gly Leu Ala Ala Gly Leu Val Gly Met Ala Ala Asp Ala Met Val Glu  
1 5 10 15  
Asp Val Asn

<210> 82  
<211> 20  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 82  
Ser Thr Glu Thr Gly Asn Gln His His Tyr Gln Thr Arg Val Val Ser  
1 5 10 15  
Asn Ala Asn Lys  
20

<210> 83  
<211> 15  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 83  
Cys Pro Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Cys  
1 5 10 15

<210> 84  
<211> 25  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> Description of Artificial Sequence: Peptide  
synthesized from amino acids with no genetic  
material as source

<400> 84  
Cys Gly Glu Thr Tyr Lys Ser Thr Val Ser His Pro Asp Leu Pro Arg  
1 5 10 15  
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Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa Ile Leu  
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Phe Gly Gly Cys Gly Gly Thr Tyr Gln Ser Arg Val Thr His Pro His  
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Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys  
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Ile

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material as source

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Ile Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile  
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Thr Thr Ile Asp Lys Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His  
35 40 45

Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
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Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Tyr Ile Asp Lys  
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Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro His Leu Pro Lys  
35 40 45

Asp Ile Val Arg Ser Ile Ala Lys Cys  
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20 25 30  
  
His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys  
35 40 45

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Ile Lys Ile Ser Leu Thr Glu Ile Arg Thr Val Ile Val Thr Arg Leu  
20 25 30  
  
Glu Thr Val Leu Phe Lys Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr  
35 40 45  
  
His Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys

50

55

60